

WHAT IS CLAIMED IS:

1. A laser beam interference optical information recording apparatus for recording on an optical information recording medium comprising an information recording layer
5 made from holographic material and a reflection layer disposed relative to one surface of the information recording layer comprising:

a light source for emitting a coherent laser beam;

10 a light source modulation means for driving a pulse emission of the light source so as to produce a signal light in response to an original information signal to be recorded; and

15 an optical system arranged to focus the signal light onto the information recording layer in a direction from the other surface of the information recording layer so as to at least partially reflect the signal light from the reflection layer, to focus a recording reference light onto the information recording layer in a direction from said one surface of the information recording layer so as to interfere
20 the signal light with the recording reference light onto the information recording layer to generate an interference pattern, and to record the interference pattern onto the information recording layer.

2. A laser beam interference optical information recording apparatus according to claim 1, wherein the optical
25 system comprises:

a collimate lens for collimating the signal light

from the light source;

a beam-splitter for diffracting the signal light transmitted from the collimate lens;

a focusing lens for focusing the signal light from the beam-splitter onto the information recording layer; and
an actuator for driving the focusing lens.

3. A laser beam interference optical information recording apparatus according to claim 1, wherein the light source is constituted of a laser diode.

4. A laser beam interference optical information reproducing apparatus for reading from an optical information recording medium comprising an information recording layer made from holographic material and a reflection layer disposed relative to one surface of the information recording layer comprising:

a light source for emitting a coherent laser beam;

a light source modulation means for driving the light source so as to produce a reproducing reference light;

an optical system arranged to focus the reproducing reference light onto the information recording layer in a direction from the other surface of the information recording layer so as to retrieve a reflection light diffracted by an interference pattern recorded onto the information recording layer; and

a photo-detector for receiving the reflection light from the optical system so as to detect an electric signal in accordance with an information recorded onto the information

recording layer.

5 5. A laser beam interference optical information reproducing apparatus according to claim 4, wherein the reproducing reference light should be adjusted to have strength enough to have little effect on the interference pattern recorded onto the information recording layer.

6. A laser beam interference optical information reproducing apparatus according to claim 4, wherein the optical system comprises:

10 a collimate lens for collimating the reproducing reference light from the light source;

a beam-splitter for diffracting the reproducing reference light transmitted from the collimate lens;

15 a first lens for focusing the reproducing reference light from the beam-splitter onto the information recording layer,

an actuator for driving the first lens; and

20 a second lens for guiding a reflection light diffracted from the information recording layer to the photo-detector passing through the first lens and the beam-splitter.

7. A laser beam interference optical information reproducing apparatus according to claim 4, wherein the light source is constituted of a laser diode.

25 8. A laser beam interference optical information recording/reproducing apparatus for recording/reproducing on an optical information recording medium comprising an information recording layer made from holographic material

and a reflection layer disposed relative to one surface of the information recording layer comprising:

a light source for emitting a coherent laser beam;

5 a light source modulation means for driving a pulse emission of the light source so as to produce a signal light in response to an original information signal at the time of recording, and for driving the light source so as to produce a reproducing reference light at the time of reproducing;

10 an optical system arranged to focus the signal light onto the information recording layer in a direction from the other surface of the information recording layer so as to at least partially reflect the signal light from the reflection layer, to focus a recording reference light onto the information recording layer in a direction from said one
15 surface of the information recording layer so as to interfere the signal light with the recording reference light onto the information recording layer to generate an interference pattern, and to record the interference pattern onto the information recording layer at the time of recording, and
20 arranged to focus the reproducing reference light onto the information recording layer in a direction from the other surface of the information recording layer so as to retrieve a reflection light diffracted by an interference pattern recorded onto the information recording layer at the time of
25 reproducing; and

a photo-detector for receiving the reflection light from the optical system so as to detect an electric signal in

accordance with an information recorded onto the information recording layer.

9. A laser beam interference optical information recording/reproducing apparatus according to claim 8, wherein
5 the optical system comprises:

a collimate lens for collimating the signal light or the reproducing reference light from the light source;

a beam-splitter for diffracting the signal light or the reproducing reference light transmitted from the
10 collimate lens;

a first lens for focusing the signal light or the reproducing reference light from the beam-splitter onto the information recording layer;

an actuator for driving the first lens; and

a second lens for guiding a reflection light diffracted from the information recording layer to the photo-detector passing through the first lens and the beam-splitter.
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10. A laser beam interference optical information recording/reproducing apparatus according to claim 8, wherein
20 the reproducing reference light should be adjusted to have strength enough to have little effect on the interference pattern recorded onto the information recording layer.

11. A laser beam interference optical information recording/reproducing apparatus according to claim 8, wherein
25 the light source is constituted of a laser diode.

12. A laser beam interference optical information recording method for recording on an optical information

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recording medium comprising an information recording layer made from holographic material and a reflection layer disposed relative to one surface of the information recording layer, comprising steps of:

5 driving a pulse emission of a light source for emitting a coherent laser beam so as to produce a signal light in response to an original information signal to be recorded,

10 focusing the signal light onto the information recording layer in a direction from the other surface of the information recording layer so as to at least partially reflect the signal light from the reflection layer,

15 focusing a recording reference light onto the information recording layer in a direction from said one surface of the information recording layer so as to interfere the signal light with the recording reference light onto the information recording layer to generate an interference pattern, and

20 recording the interference pattern onto the information recording layer.

25 13. A laser beam interference optical information reproducing method for reading from an optical information recording medium comprising an information recording layer made from holographic material and a reflection layer disposed relative to one surface of the information recording layer, comprising steps of:

driving a light source for emitting a coherent laser

beam so as to produce a reproducing reference light,

focusing the reproducing reference light onto the information recording layer in a direction from the other surface of the information recording layer so as to retrieve a reflection light diffracted by an interference pattern recorded onto the information recording layer, and

receiving the reflection light so as to detect an electric signal in accordance with an information recorded onto the information recording layer.

14. A laser beam interference optical information reproducing method according to claim 13, wherein the reproducing reference light should be adjusted to have strength enough to have little effect on the interference pattern recorded onto the information recording layer.

15. A laser beam interference optical information recording/reproducing method for recording/reproducing on an optical information recording medium comprising an information recording layer made from holographic material and a reflection layer disposed relative to one surface of the information recording layer, comprising steps of:

driving a pulse emission of a light source for emitting a coherent laser beam so as to produce a signal light in response to an original information signal to be record at the time of recording,

driving the light source so as to produce a reproducing reference light at the time of reproducing,

focusing the signal light onto the information

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recording layer in a direction from the other surface of the information recording layer so as to at least partially reflect the signal light from the reflection layer,

5 focusing a recording reference light onto the information recording layer in a direction from said one surface of the information recording layer so as to interfere the signal light with the recording reference light onto the information recording layer to generate an interference pattern, and

10 recording the interference pattern onto the information recording layer at the time of recording,

15 focusing the reproducing reference light onto the information recording layer in a direction from the other surface of the information recording layer so as to retrieve a reflection light diffracted by an interference pattern recorded onto the information recording layer, and

20 receiving the reflection light so as to detect an electric signal in accordance with an information recorded onto the information recording layer at the time of reproducing.

25 16. A laser beam interference optical information recording/reproducing method according to claim 15, wherein the reproducing reference light should be adjusted to have strength enough to have little effect on the interference pattern recorded onto the information recording layer.